



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/757,772 | 01/14/2004 | Francesco Pappalardo | 854063.740 | 5496 |
| 38106 7590 07/24/2008 SEED INTELLECTUAL PROPERTY LAW GROUP PLLC 701 FIFTH AVENUE, SUITE 5400 SEATTLE, WA 98104-7092 | | | | |
| | | | EXAMINER | |
| | | | HOUSHMAND, HOOMAN | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2619 | |
| | | | MAIL DATE | DELIVERY MODE |
| | | | 07/24/2008 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/757,772

Applicant(s)

PAPPALARDO ET AL.

Examiner

Hooman Houshmand

Art Unit

2619

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 June 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/CDC)
- Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/24/2008 has been entered.

Response to Amendment

2. The amended drawings have been accepted and the objection to the drawings has been withdrawn.
3. The amendments to the claims and the pointing out of the written description of another amendment (page 16 of the remarks) have been accepted and the rejections under USC 112 have been withdrawn.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Art Unit: 2619

5. Claims 13-16, 17-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.
6. Claim 17 line 9 and claim 13 line 7 recite the newly amended limitation *signal generating means for generating and transmitting on said single line an identity signal, in addition to at least one signal that transmits said data* which was not described in the original disclosure.
7. Newly added claim 25 recites *a most probable sorting pattern determined according to analysis of traffic on said bus*. It is unclear how *a most probable sorting pattern is determined according to analysis of traffic on a bus*.
8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
9. Claim 25 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
10. Newly added claim 25 recites *first internal states*. It is unclear what *first* refers to.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Curran (US 5572736) in view of Szepesi (US 5680300).

Regarding **Claim 1**: Curran teaches *a method for transmitting data on a bus* (col 1 lines 16-18) *with minimization of the bus switching activity* (col 2 lines 6-8), *converting the datum (bits) to be transmitted from its own original format into a transmission format* (switching codes and code word col 2 lines 5-8, col 4 lines 51-59) *that reduces the bus switching activity* (minimize the number of bits which switch between the zero and one states col 2 lines 2-14), *converting including: swapping the position of one or more bits of the datum to be transmitted* (a function of the data word to be transmitted col 2 lines 10-11), *swapping being performable according to a plurality of different variants* (the resulting code words represent the possible code words which could be transmitted col 2 lines 32-34), *each of which is identified by a respective sorting pattern* (a set of maximally distant mappings is derived col 2 lines 30-31, col 2 lines 59-65); *and selecting, between the various sorting patterns* (the code word which is minimally distant from the previous code word is selected col 2 lines 34-35), *a sorting pattern that reduces the bus switching activity upon transmission on the bus* (the number of bus drivers to be switched reduced col 2 lines 36-37) *of the datum generated using selected sorting pattern* (switching code identifying the mapping code col 2 lines 60-63);

Art Unit: 2619

transmitting on the bus the datum in transmission format; transmitting on the bus the selected sorting pattern (switching code identifying the mapping code col 2 lines 60-65); receiving the datum in transmission format (receiving circuit); receiving the selected sorting pattern transmitted on the bus (code word); and converting the datum received from transmission format to original format using the selected sorting pattern received (receiving circuit, maps the received code word into the original data word, as that data word existed prior to transmission col 2 lines 63-65), a succession of sorting patterns generated at a transmission end (resulting code words represent the possible code words which could be transmitted col 2 lines 32-34) and a succession of sorting patterns generated at a reception end (receiver generates new mappings col 4 lines 42-59) are synchronized with each using a common clock signal (synchronization signal, push-pull bus driver col 4 lines 6-21).

Curran may not explicitly teach push-pull bus driver used for *synchronization*.

Szepesi teaches *synchronization* with push-pull drive (col 6 lines 18-34).

Both Szepesi and Curran are in the electronics field; using electronics for timing, their art is analogous.

Teachings of Szepesi and Curran can be combined - using a push-pull drive to achieve synchronization - to produce the applicant's invention.

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Curran teaches *transmitting and receiving on the bus the selected sorting pattern* (switching code identifying the mapping code col 2 lines 60-65).

Curran may not explicitly teach *transmitting on one additional line of the bus the selected sorting pattern*.

It would have been obvious; to a person having ordinary skill in the art, at the time that the invention was made, that the two above limitations are obvious variants of one another. In the first limitation *the selected sorting pattern is transmitted and received on the bus*. The variant is *the selected sorting pattern is transmitted on one additional line of the bus*. A person having ordinary skill in the art would recognize that the functionality of the two structures is the same. The second structure has an additional line; however, the information that was originally carried on one bus is now carried on two communication lines.

Regarding **Claim 2**: Curran teaches *generating a succession of sorting patterns identifying all the possible swaps of the position of the bit or bits of the datum to be transmitted* (resulting code words represent the possible code words which could be transmitted col 2 lines 32-34); *comparing the optimal - particular - sorting pattern to be transmitted with the sorting patterns generated* (set of maximally distant mappings derived col 2 lines 30-31); *generating and transmitting on the bus a synchronization (push-pull bus driver col 4 lines 6-21) signal upon detection of the coincidence (minimally distant) between the optimal - particular - sorting pattern to be transmitted*

Art Unit: 2619

and one of the sorting patterns generated (the code word which is minimally distant from the previous code word is selected col 2 lines 34-35).

Curran may not explicitly teach push-pull bus driver used for *synchronization*.

Szepesi teaches *synchronization* with push-pull drive (col 6 lines 18-34).

Both Szepesi and Curran are in the electronics field; using electronics for timing, their art is analogous.

Teachings of Szepesi and Curran can be combined - using a push-pull drive to achieve synchronization - to produce the applicant's invention.

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Regarding **Claim 3**: Curran teaches *receiving the selected sorting pattern transmitted on the bus includes generating a succession of sorting patterns* (mappings) *identical to, and synchronous* (instead of complementing an entire word - bus inverted – mapping codes are generated col 4 lines 42-59) *with, the generated succession of sorting patterns identifying all possible swaps of the position of the bit or bits of the datum to be transmitted* (resulting code words represent the possible code words which could be transmitted col 2 lines 32-34) *and identifying the sorting pattern generated at the instant of reception of the synchronization* (push-pull bus driver col 4 lines 6-21) *signal transmitted on the bus* (At the receiving end, the bits of the code word identified by the switching code are modified to reconstruct the transmitted data word col 3 lines 7-9), *the*

sorting pattern identified being identical to said selected sorting pattern to be transmitted (receiving circuit maps the received code word into the original data word, as that data word existed prior to transmission col 2 lines 63-65).

Curran may not explicitly teach push-pull bus driver used for *synchronization*.

Szepesi teaches *synchronization* with push-pull drive (col 6 lines 18-34).

Both Szepesi and Curran are in the electronics field; using electronics for timing, their art is analogous.

Teachings of Szepesi and Curran can be combined - using a push-pull drive to achieve synchronization - to produce the applicant's invention.

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Regarding **Claim 4**: Curran teaches *the sorting pattern selected reduces the bus switching activity (zero and one switching) to a minimum amount* (minimize the number of bits which switch between the zero and one states col 2 lines 6-7) *and the sorting pattern selected is the optimal* (reduced delta-I noise and power consumption) *sorting pattern* (the number of bit drivers which are required to switch between the zero and one position is reduced, thereby substantially reducing the delta-I noise and power consumption col 2 lines 55-58).

Regarding **Claim 5**: Curran teaches *generating a succession of sorting patterns* (set of maximally distant mappings is derived col 2 lines 30-31) *includes providing a finite state machine* (a model of the algorithm, IEEE definition) *having a number of internal states* (the generated code words) *equal to the number of possible swaps of the position of the bit or bits of the datum to be transmitted* (plurality of the generated code words, the one which differs in the smallest number of bit positions from the previously transmitted code word is selected col 2 lines 51-55); *associating to each of the internal states of finite state machine a respective sorting pattern* (a plurality of mapping codes are generated, each identified by the state of the switch bits col 4 lines 44-46); *and operating finite state machine at a given frequency so as to cause its internal state to evolve* (compute) *and generate said sorting patterns* (Each of the code words is compared with a previously transmitted code word and the Hamming distance between each of the generated code words and the previously transmitted code word are computed. The code word with the lowest Hamming distance is selected and transmitted in the next bus cycle col 4 lines 51-57).

Curran teaches *using the same clock signal* (push-pull bus driver col 4 lines 6-21). Curran may not explicitly teach push-pull bus driver used for *synchronization*. Szepesi teaches *synchronization* with push-pull drive (col 6 lines 18-34). It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Regarding **Claim 6**: Curran teaches *generating a succession of sorting patterns includes generating a plurality of disjoint sets of sorting patterns* (set of maximally distant mappings is derived col 2 lines 30-31), *each set being formed by a sorting pattern identifying a respective subset of possible swaps of the position of the bit or bits of the datum to be transmitted* (one of the generated code words which differs in the smallest number of bit positions from the previously transmitted code word is selected col 2 lines 51-55), *the sorting patterns of each set being further generated in succession and in a synchronous* (instead of complementing an entire word - bus inverted - mapping codes are generated col 4 lines 42-59) *way with respect to the sorting patterns of the other sets* (a plurality of mapping codes are generated col 4 lines 44-46).

Regarding **Claim 7**: Curran teaches *generating a plurality of separate sets of sorting patterns* (set of maximally distant mappings is derived col 2 lines 30-31) *includes, for each said set of sorting patterns, providing a finite state machine* (a model of the algorithm - IEEE definition) *having a number of internal states* (the generated code words) *equal to the number of sorting patterns in the set* (one of the generated code words which differs in the smallest number of bit positions from the previously transmitted code word is selected col 2 lines 51-55); *associating to each of the internal states of said finite state machine a respective sorting pattern* (a plurality of mapping codes are generated, each identified by the state of the switch bits col 4 lines 44-46); *and operating said finite state machine at a given frequency so as to cause its internal state to evolve* (compute) *and generate the corresponding sorting patterns* (each of the

code words is compared with a previously transmitted code word and the Hamming distance between each of the generated code words and the previously transmitted code word are computed. The code word with the lowest Hamming distance is selected and transmitted in the next bus cycle col 4 lines 51-57).

Curran teaches *using the same clock signal* (push-pull bus driver col 4 lines 6-21). Curran may not explicitly teach push-pull bus driver used for *synchronization*.

Szepesi teaches *synchronization* with push-pull drive (col 6 lines 18-34).

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Regarding **Claim 8**: Curran teaches *a device and system for transmitting data on a bus* (col 1 lines 16-18) *with minimization of the bus switching activity* (col 2 lines 6-8), *first converting means for converting the datum (bits) to be transmitted from its own original format to a transmission format* (switching codes and code word col 2 lines 5-8, col 4 lines 51-59) *that minimizes the bus switching activity* (minimize the number of bits which switch between the zero and one states col 2 lines 2-14), *first converter means includes a swap operator for swapping the position of one or more bits of the datum to be transmitted* (a function of the data word to be transmitted col 2 lines 10-11), *swapping being performable according to different variants* (the resulting code words represent the possible code words which could be transmitted col 2 lines 32-34), *each of which is identified by a respective sorting pattern* (a set of maximally distant mappings is derived

Art Unit: 2619

col 2 lines 30-31); *and selecting means for selecting, between the various sorting patterns* (the code word which is minimally distant from the previous code word is selected col 2 lines 34-35), *an optimal sorting pattern that minimizes the bus switching activity* (the number of bus drivers to be switched reduced col 2 lines 36-37) *upon transmission on the bus of the datum generated using optimal sorting pattern* (switching code identifying the mapping code col 2 lines 60-63); *transmitting means for transmitting on the bus the datum in transmission format and the optimal sorting pattern*; *receiving means for receiving the datum in transmission format and optimal sorting pattern* (code word) *transmitted on the bus*; *and second converting means for converting the datum received from transmission format to original format using optimal sorting pattern received* (receiving circuit, maps the received code word into the original data word, as that data word existed prior to transmission col 2 lines 63-65), *transmitting means includes first sorting pattern generating means for generating a succession of sorting patterns identifying all the possible swaps of the position of the bit or bits of the datum to be transmitted* (resulting code words represent the possible code words which could be transmitted col 2 lines 32-34); *comparing means for comparing the optimal sorting pattern to be transmitted with the sorting patterns generated* (set of maximally distant mappings derived col 2 lines 30-31); *signal generating means for generating and sending onto bus a synchronization* (push-pull bus driver col 4 lines 6-21) *signal upon detection of the identity* (minimally distant) *between the optimal sorting pattern to be transmitted and one of the sorting patterns generated* (the code word which is minimally distant from the previous code word is selected col 2 lines 34-35), *receiving means*

includes second sorting pattern generating means for generating a succession of sorting patterns (mappings) identical to, and synchronous (instead of complementing an entire word - bus inverted – mapping codes are generated col 4 lines 42-59) with, the sorting patterns generated by the first sorting pattern generating means for transmission (receiver applies reverse mapping to recover the original data word, it makes a state transition from the last state it was in to a new state, col 4 lines 57-59); and detecting means for identifying the sorting pattern generated by second sorting pattern generating means at the instant of reception of the synchronization (push-pull bus driver col 4 lines 6-21) signal transmitted on the bus (at the receiving end, the bits of the code word identified by the switching code are modified to reconstruct the transmitted data word col 3 lines 7-9), the sorting pattern identified being identical to optimal sorting pattern to be transmitted (receiving circuit maps the received code word into the original data word, as that data word existed prior to transmission col 2 lines 63-65), a succession of sorting patterns generated at a transmission end (resulting code words represent the possible code words which could be transmitted col 2 lines 32-34) and a succession of sorting patterns generated at a reception end (receiver generates new mappings col 4 lines 42-59) are synchronized with each using a common clock signal (synchronization signal, push-pull bus driver col 4 lines 6-21).

Curran may not explicitly teach: push-pull bus driver used for *synchronization*.

Szepesi teaches: *synchronization* with push-pull drive (col 6 lines 18-34).

Both Szepesi and Curran are in the electronics field, their art is analogous.

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Curran teaches *transmitting and receiving on the bus the selected sorting pattern* (switching code identifying the mapping code col 2 lines 60-65).

Curran may not explicitly teach *transmitting on one additional line of the bus the selected sorting pattern*.

It would have been obvious; to a person having ordinary skill in the art, at the time that the invention was made, that the two above limitations are obvious variants of one another. In the first limitation *the selected sorting pattern is transmitted and received on the bus*. The variant is *the selected sorting pattern is transmitted on one additional line of the bus*. A person having ordinary skill in the art would recognize that the functionality of the two structures is the same. The second structure has an additional line; however, the information that was originally carried on one bus is now carried on two communication lines.

Regarding **Claim 9**: Curran teaches *first and second sorting pattern generating means each comprise a finite state machine (a model of the algorithm – IEEE definition) having a number of internal states (the generated code words) equal to the number of possible swaps of the position of the bit or bits of the datum to be transmitted (one of the generated code words which differs in the smallest number of bit positions from the previously transmitted code word is selected col 2 lines 51-55), a respective sorting*

Art Unit: 2619

pattern (a plurality of mapping codes are generated, each identified by the state of the switch bits col 4 lines 44-46) *being associated to each of the internal states of finite state machine, finite state machine being operated at a given frequency so as to cause its internal state to evolve* (compute) *and generate sorting patterns* (each of the code words is compared with a previously transmitted code word and the Hamming distance between each of the generated code words and the previously transmitted code word are computed. The code word with the lowest Hamming distance is selected and transmitted in the next bus cycle col 4 lines 51-57).

Regarding **Claim 10**: Curran teaches *first and second sorting pattern generating means each comprise a plurality of sorting pattern modules generating a plurality of disjoint sets of sorting patterns* (set of maximally distant mappings is derived col 2 lines 30-31), *each set being formed by a sorting pattern identifying a respective subset of all the possible swaps of the position of the bit or bits of the datum to be transmitted* (one of the generated code words which differs in the smallest number of bit positions from the previously transmitted code word is selected col 2 lines 51-55), *the sorting patterns of each set being further generated in succession and in a synchronous* (instead of complementing an entire word - bus inverted – mapping codes are generated col 4 lines 42-59) *way with respect to the sorting patterns of the other sets* (a plurality of mapping codes are generated col 4 lines 44-46).

Regarding **Claim 11**: Curran teaches *each sorting pattern* (set of maximally distant mappings is derived col 2 lines 30-31) *generating modules comprises a finite state machine* (a model of the algorithm – IEEE definition) *having a number of internal states* (the generated code words) *equal to the number of sorting patterns of the corresponding set* (one of the generated code words which differs in the smallest number of bit positions from the previously transmitted code word is selected col 2 lines 51-55), *a respective sorting pattern being associated to each of the internal states of said finite state machine* (a plurality of mapping codes are generated, each identified by the state of the switch bits col 4 lines 44-46), *finite state machine being operated at a given frequency so as to cause its internal state to evolve* (compute) *and generate sorting patterns* (each of the code words is compared with a previously transmitted code word and the Hamming distance between each of the generated code words and the previously transmitted code word are computed. The code word with the lowest Hamming distance is selected and transmitted in the next bus cycle col 4 lines 51-57).

Curran teaches *using the same clock signal* (push-pull bus driver col 4 lines 6-21). Curran may not explicitly teach push-pull bus driver used for *synchronization*. Szepesi teaches *synchronization* with push-pull drive (col 6 lines 18-34). It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Regarding **Claim 12**: Curran teaches *a computer product (col 1 line 16) loadable into a memory associated with a bus, said computer product having portions of software code that (computer system, data is transmitted as a multi-bit data word between units such as processors and memories, by means of bus driver circuits col 1 lines 16-18) are executable by a processor to minimize bus switching activity (minimize the number of bits which switch between the zero and one states col 2 lines 2-14), by converting a datum to be transmitted from its own original format into a transmission format that reduces the bus switching activity (a function of the data word to be transmitted col 2 lines 10-11), converting includes swapping a position of one or more bits of the datum to be transmitted, said swapping being performable according to a plurality of different variants (The resulting code words represent the possible code words which could be transmitted col 2 lines 32-34), each of which is identified by a respective sorting pattern (a set of maximally distant mappings is derived col 2 lines 30-31); and selecting, between the sorting patterns (the code word which is minimally distant from the previous code word is selected col 2 lines 34-35), a particular sorting pattern that reduces the bus switching activity (the number of bus drivers to be switched reduced col 2 lines 36-37) upon transmission on the bus of the datum generated using selected sorting pattern (switching code identifying the mapping code col 2 lines 60-63); transmitting on the bus the datum in said transmission format; and transmitting on the bus a synchronization (push-pull bus driver col 4 lines 6-21) signal usable by a receiving device to identify selected sorting pattern from sorting patterns (at the receiving end, the bits of the code word identified by the switching code are modified to reconstruct the*

Art Unit: 2619

transmitted data word col 3 lines 7-9), *a succession of sorting patterns generated at a transmission end* (resulting code words represent the possible code words which could be transmitted col 2 lines 32-34) *and a succession of sorting patterns generated at a reception end* (receiver generates new mappings col 4 lines 42-59) *are synchronized with each using a common clock signal* (synchronization signal, push-pull bus driver col 4 lines 6-21).

Curran may not explicitly teach: push-pull bus driver used for *synchronization*.

Szepesi teaches: *synchronization* with push-pull drive (col 6 lines 18-34).

Both Szepesi and Curran are in the electronics field; using electronics for timing, their art is analogous.

Teachings of Szepesi and Curran can be combined - using a push-pull drive to achieve synchronization - to produce the applicant's invention.

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Curran teaches *transmitting and receiving on the bus the selected sorting pattern* (switching code identifying the mapping code col 2 lines 60-65).

Curran may not explicitly teach *transmitting on one additional line of the bus the selected sorting pattern*.

It would have been obvious; to a person having ordinary skill in the art, at the time that the invention was made, that the two above limitations are obvious variants of one another. In the first limitation *the selected sorting pattern is transmitted and received on*

Art Unit: 2619

the bus. The variant is the selected sorting pattern is transmitted on one additional line of the bus. A person having ordinary skill in the art would recognize that the functionality of the two structures is the same. The second structure has an additional line; however, the information that was originally carried on one bus is now carried on two communication lines.

Regarding **Claim 13**: Curran teaches *transmitting n-bit data on a single line, generating in succession all the possible combinations of n bits* (code words col 2 lines 31-35); *comparing the n-bit datum to be transmitted with the combinations of n bits generated* (set of maximally distant mappings derived col 2 lines 30-31); *generating and transmitting on a single line an identity signal* (minimally distant) *upon detection of the coincidence between the n-bit datum to be transmitted and one of the combinations of n bits generated* (the code word which is minimally distant from the previous code word is selected col 2 lines 34-35) , *and in reception, generating a succession of combinations of n bits* (mappings) *identical and synchronous to the combinations generated in succession in transmission* (receiver applies reverse mapping to recover the original data word col 4 lines 57-59, the receiver transitions from the previous state to the new state, mapping codes are generated col 4 lines 42-59); *and identifying the combination of n bits generated at the instant of reception of the identity signal transmitted on the single line* (at the receiving end, the bits of the code word identified by the switching code are modified to reconstruct the transmitted data word col 3 lines 7-9), *the combination of n bits identified being identical - corresponding - to the n-bit datum to be*

Art Unit: 2619

transmitted (receiving circuit maps the received code word into the original data word, as that data word existed prior to transmission col 2 lines 63-65), *a succession of sorting patterns generated at a transmission end* (resulting code words represent the possible code words which could be transmitted col 2 lines 32-34) *and a succession of sorting patterns generated at a reception end* (receiver generates new mappings col 4 lines 42-59) *are synchronized with each using a common clock signal* (synchronization signal, push-pull bus driver col 4 lines 6-21).

Curran may not explicitly teach: push-pull bus driver used for *synchronization*.

Szepesi teaches: *synchronization* with push-pull drive (col 6 lines 18-34).

Both Szepesi and Curran are in the electronics field; using electronics for timing, their art is analogous.

Teachings of Szepesi and Curran can be combined - using a push-pull drive to achieve synchronization - to produce the applicant's invention.

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Regarding **Claim 14**: Curran teaches *generating in succession all the possible combinations of n bits* (set of maximally distant mappings is derived col 2 lines 30-31), *in transmission and reception* (corresponding states exist at both the transmitter and receiver - the code words. The switch bits indicate which state to transition to next. These switch bits are calculated at the transmitter, and communicated to the receiver

Art Unit: 2619

4:42-59), *includes providing a finite state machine* (a model of the algorithm – IEEE definition) *having a number of internal states* (the generated code words) *equal to the number of possible combinations of n bits* (plurality of the generated code words, the one which differs in the smallest number of bit positions from the previously transmitted code word is selected col 2 lines 51-55); *associating to each of the internal states of finite state machine a respective combination of n bits* (a plurality of mapping codes are generated, each identified by the state of the switch bits col 4 lines 44-46); *and operating finite state machine at a given frequency so as to cause its internal state to evolve (compute) and generate the corresponding combinations of n bits* (each of the code words is compared with a previously transmitted code word and the Hamming distance between each of the generated code words and the previously transmitted code word are computed. The code word with the lowest Hamming distance is selected and transmitted in the next bus cycle col 4 lines 51-57).

Curran teaches *using the same clock signal* (push-pull bus driver col 4 lines 6-21). Curran may not explicitly teach push-pull bus driver used for *synchronization*.

Szepesi teaches *synchronization* with push-pull drive (col 6 lines 18-34).

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Regarding **Claim 15**:

Curran teaches *generating the combinations of n bits includes generating a plurality of disjoint sets of possible combinations of n bits* (set of maximally distant mappings is derived col 2 lines 30-32), *in transmission and reception* (corresponding states exit at both the transmitter and receiver - the code words. The switch bits indicate which state to transition to next. These switch bits are calculated at the transmitter, and communicated to the receiver 4:42-59), *the combinations of n bits of each set being further generated in succession and in a synchronous* (instead of complementing an entire word - bus inverted – mapping codes are generated col 4 lines 42-59) way with respect to the combinations of n bits of the other sets (a plurality of mapping codes are generated col 4 lines 44-46).

Regarding **Claim 16**: Curran teaches, *in transmission and reception* (corresponding states exit at both the transmitter and receiver, the code words. The switch bits indicate which state to transition to next. These switch bits are calculated at the transmitter, according to the data to be transmitted, and communicated to the receiver 4:42-59), *generating a plurality of disjoint sets of possible combinations of n bits* (set of maximally distant mappings is derived col 2 lines 30-32) *includes, for each set of combinations of n bits, providing a finite state machine* (a model of the algorithm – IEEE definition) *having a number of internal states* (the generated code words) *equal to the number of combinations of n bits in the set* (plurality of the generated code words, the one which differs in the smallest number of bit positions from the previously transmitted code word is selected col 2 lines 51-55); *associating to each of the internal states of finite state*

machine a respective combination of n bits (a plurality of mapping codes are generated, each identified by the state of the switch bits col 4 lines 44-46); *and operating finite state machine at a given frequency so as to cause its internal state to evolve* (compute) *and generate the corresponding combinations of n bits* (each of the code words is compared with a previously transmitted code word and the Hamming distance between each of the generated code words and the previously transmitted code word are computed. The code word with the lowest Hamming distance is selected and transmitted in the next bus cycle col 4 lines 51-57).

Curran teaches *using the same clock signal* (push-pull bus driver col 4 lines 6-21). Curran may not explicitly teach push-pull bus driver used for *synchronization*.

Szepesi teaches *synchronization* with push-pull drive (col 6 lines 18-34).

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Regarding **Claim 17**: Curran teaches *a system for transmitting n -bit data on a single line, including, at the transmission end: first combination generating means for generating in succession all the possible combinations of n bits* (resulting code words represent the possible code words which could be transmitted col 2 lines 32-34); *comparing means for comparing the n -bit datum to be transmitted with the combinations of n bits generated* (set of maximally distant mappings derived col 2 lines 30-32); *signal generating means for generating and transmitting on a single line an identity signal*

upon detection (minimally distant) of the coincidence between the n-bit datum to be transmitted and one of the combinations of n bits generated (the code word which is minimally distant from the previous code word is selected col 2 lines 34-35); at the reception end: second combination generating means for generating the same succession of combinations of n bits (receiver applies reverse mapping to recover the original data word col 4 lines 57-59, the state transitions to the new state), generated by the first combination generating means, the successions of combinations of n bits as that generated by the said first and second combination-generating means being synchronized (push-pull bus driver col 4 lines 6-21; instead of complementing an entire word - bus inverted – mapping codes are generated col 4 lines 42-59) with one another; and detecting means for identifying the combination of n bits generated, by receiver, at the instant of reception of the identity signal transmitted on the single line (at the receiving end, the bits of the code word identified by the switching code are modified to reconstruct the transmitted data word col 3 lines 7-9) , the combination of n bits identified being identical, corresponding, to the n-bit datum to be transmitted (receiving circuit maps the received code word into the original data word, as that data word existed prior to transmission col 2 lines 63-65), a succession of sorting patterns generated at a transmission end (resulting code words represent the possible code words which could be transmitted col 2 lines 32-34) and a succession of sorting patterns generated at a reception end (receiver generates new mappings col 4 lines 42-59) are synchronized with each using a common clock signal (synchronization signal, push-pull bus driver col 4 lines 6-21).

Art Unit: 2619

Curran may not explicitly teach: push-pull bus driver used for *synchronization*.

Szepesi teaches: *synchronization* with push-pull drive (col 6 lines 18-34).

Both Szepesi and Curran are in the electronics field; using electronics for timing, their art is analogous.

Teachings of Szepesi and Curran can be combined - using a push-pull drive to achieve synchronization - to produce the applicant's invention.

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Regarding **Claim 18**: Curran teaches a *finite state machine* (a model of the algorithm – IEEE definition) *having a number of internal states* (the generated code words) *equal to the number of possible combinations of n bits* (plurality of the generated code words, the one which differs in the smallest number of bit positions from the previously transmitted code word is selected col 2 lines 51-55), *a respective combination of n bits being associated to each of the internal states of finite state machine* (a plurality of mapping codes are generated, each identified by the state of the switch bits col 4 lines 44-46) , *and finite state machine being operated at a given frequency so as to cause its internal state to evolve (compute) and generate the corresponding combinations of n bits* (each of the code words is compared with a previously transmitted code word and the Hamming distance between each of the generated code words and the previously

transmitted code word are computed. The code word with the lowest Hamming distance is selected and transmitted in the next bus cycle col 4 lines 51-57).

Curran teaches *using the same clock signal* (push-pull bus driver col 4 lines 6-21). Curran may not explicitly teach push-pull bus driver used for *synchronization*.

Szepesi teaches *synchronization* with push-pull drive (col 6 lines 18-34).

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Regarding **Claim 19**: Curran teaches *combination generating modules generating a plurality of disjoint sets of possible combinations of n bits* (set of maximally distant mappings is derived col 2 lines 30-32), *the combinations of n bits of each set being generated in succession and in a synchronous* (instead of complementing an entire word - bus inverted – mapping codes are generated col 4 lines 42-44) way with respect to the combinations of n bits of the other sets (a plurality of mapping codes are generated col 4 lines 44-46).

Regarding **Claim 20**: Curran teaches *combination generating modules* (set of maximally distant mappings is derived col 2 lines 30-31) *comprises a finite state machine* (a model of the algorithm – IEEE definition) *having a number of internal states* (the generated code words) *equal to the number of combinations of n bits in the set* (plurality of the generated code words, the one which differs in the smallest number of bit positions from

Art Unit: 2619

the previously transmitted code word is selected col 2 lines 51-55), *a respective combination of n bits being associated to each of the internal states of finite state machine* (a plurality of mapping codes are generated, each identified by the state of the switch bits col 4 lines 44-46) , *and finite state machine being operated at a given frequency so as to cause its internal state to evolve (compute) and generate the corresponding combinations of n bits* (each of the code words is compared with a previously transmitted code word and the Hamming distance between each of the generated code words and the previously transmitted code word are computed. The code word with the lowest Hamming distance is selected and transmitted in the next bus cycle col 4 lines 51-57).

Curran teaches *using the same clock signal* (push-pull bus driver col 4 lines 6-21). Curran may not explicitly teach push-pull bus driver used for *synchronization*. Szepesi teaches *synchronization* with push-pull drive (col 6 lines 18-34).

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Regarding **Claim 21**: Curran teaches *a computer product* (col 1 line 16) *loadable into memory, including software code that implement the method* (computer system, data is transmitted as a multi-bit data word between units such as processors and memories, by means of bus driver circuits col 1 lines 16-18) *when the computer product is executed by a digital processor associated to the bus* (col 1 lines 17-18).

Regarding **Claim 22**: Curran teaches *a transmitter device* (col 1 lines 16-18), *a converter to convert a datum to be transmitted from an initial format to a transmission format* (switching codes and code word col 2 lines 5-8, col 4 lines 51-59), *transmission format being a selected sorting pattern from among a succession of sorting patterns that identify possible swaps of bit positions of datum* (the resulting code words represent the possible code words which could be transmitted col 2 lines 32-34); *a first finite state machine having a number of internal states* (the generated code words) *equal to a number of sorting patterns* (plurality of the generated code words, the one which differs in the smallest number of bit positions from the previously transmitted code word is selected col 2 lines 51-55) *and each of internal states respectively corresponding to one of sorting patterns* (a plurality of mapping codes are generated, each identified by the state of the switch bits col 4 lines 44-46); *and a common clock* (synchronization signal, push-pull bus driver col 4 lines 6-21) *adapted coupled to first finite state machine* (IEEE definition: a computational model consisting of a finite number of states and transitions between those states, possibly with accompanying actions) *to synchronize first finite state machine with a second finite state machine, at a receiving end* (corresponding states exit at both the transmitter and receiver - the code words. The switch bits indicate which state to transition to next. These switch bits are calculated at the transmitter, and communicated to the receiver 4:42-59), *that receives datum in transmission format* (switching codes and code word col 2 lines 5-8, col 4 lines 51-59) *and that has a number of internal states* (the generated code words) *equal to number of sorting*

Art Unit: 2619

patterns (resulting code words represent the possible code words col 2 lines 32-34) *and each of internal states of second finite state machine at the receiving end respectively corresponding to one of sorting patterns, first finite state machine is adapted to generate a synchronization signal to be received by second state machine, synchronization signal* (push-pull bus driver col 4 lines 6-21) *corresponding to a particular state of first finite state machine and adapted to be used by second finite state machine to identify selected sorting pattern* (switching code identifying the mapping code col 2 lines 60-63) (the generated code word which differs in the smallest number of bit positions from the previously transmitted code word is selected col 2 lines 51-55).

Curran may not explicitly teach: push-pull bus driver used for *synchronization*.

Szepesi teaches: *synchronization* with push-pull drive (col 6 lines 18-34).

Both Szepesi and Curran are in the electronics field; using electronics for timing, their art is analogous.

Teachings of Szepesi and Curran can be combined - using a push-pull drive to achieve synchronization - to produce the applicant's invention.

It would have been obvious; at the time the invention was made, for a person having ordinary skill in the art to combine the teachings of Szepesi with Curran to produce accurate reception of data at the receiver.

Curran teaches *transmitting and receiving on the bus the selected sorting pattern* (switching code identifying the mapping code col 2 lines 60-65).

Curran may not explicitly teach *transmitting on one additional line of the bus the selected sorting pattern*.

It would have been obvious; to a person having ordinary skill in the art, at the time that the invention was made, that the two above limitations are obvious variants of one another. In the first limitation *the selected sorting pattern is transmitted and received on the bus*. The variant is *the selected sorting pattern is transmitted on one additional line of the bus*. A person having ordinary skill in the art would recognize that the functionality of the two structures is the same. The second structure has an additional line; however, the information that was originally carried on one bus is now carried on two communication lines.

Regarding **Claim 23**: Curran teaches (7:16-47) *a register to store sorting patterns*.

Regarding **Claim 24**: Curran teaches *sorting patterns are from among a plurality of disjoint sets of sorting patterns* (set of maximally distant mappings is derived col 2 lines 30-31).

13. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Curran and Szepesi, in view of Rui (20020196327).

Regarding **Claim 25**. Curran may not explicitly teach *first internal state of finite state machine corresponds to a most probable pattern*.

Art Unit: 2619

In the same field of endeavor, Rui discloses *first internal state of finite state machine corresponds to a most probable pattern* ([0127] probabilistic finite state machine, [0111] history data, [0108] history-based).

It would have been obvious, at the time that the invention was made, to a person having ordinary skill in the art to combine the teachings of Rui with Curran to automate the use of expert rules.

Response to Arguments

14. Applicant's arguments filed 06/24/2008 have been fully considered but they are not persuasive.

15. Applicant's arguments with respect to claim 1-25 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hooman Houshmand whose telephone number is (571)270-1817. The examiner can normally be reached on Monday - Friday 8 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571) 272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2619

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. H./
Examiner, Art Unit 2619

/Hassan Kizou/
Supervisory Patent Examiner, Art Unit 2619